An
Inaugural Essay

on

Passed March 1829

Hydrocephalus;

Submitted to the Medical Faculty
of the
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by
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of
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Hydrocephalus vel Hydrencephalus.

This term, derived from the Greek words ὕδωρ, water, and κεφαλή, the head, signifies a Dropsy of the Brain. It is a disease, which varies greatly both in its course and termination.

It was not until the appearance of Dr. Whytt's treatise on the subject, about sixty years ago, that it was considered as a separate disease. Formerly, it was divided into Externus and Internus; it was denominated Externus, when the water had collected between the membranes of the Brain, but when the fluid was contained in the ventricles, it was called Internus. But these appellations seem to have been in a great measure forsaken.

The division of the disease is now generally, into Acute and Chronic. It is the former, or the acute species, of which I intend, more particularly to speak. It assumes various forms, and hence, there is frequently great difficulty in distinguishing the different

symptoms which are regarded as peculiar to it. Children are more particularly exposed to its attacks, and although adults are by no means entirely free from it, yet it seldom makes its appearance after the age of puberty. Latterly, however, it has been supposed, that individuals in advanced life, are more subject to its attacks than had formerly been imagined.

It is a disease peculiar to all seasons of the year, though some are of opinion that its attacks are more frequent in the summer.

Those children who are of a scrophulous habit, and have the peculiarities of appearance incident to that disease, are supposed to be particularly liable to Hydrocephalus.

Particular families are exposed to it, as there are instances on record, where several children of the same parents have suffered from it. Instances have been known where it has been converted into a scrophulous disease.

Dr. Cheyne gives it as his opinion, that when it is a family complaint, cures are more easily effected.

The proximate cause of the disease has been the origin of

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many controversies, and there is still considerable doubt on the subject. This, with other circumstances, tends to make the disease to those not well acquainted with its peculiar symptoms one, of great embarassment.

It was the opinion of the late Dr. Rush, that it ought to be considered as the effect of a primary inflammation, or accumulation of blood in the Brain. He says that "the first stage of the disease is the effect of causes, which produce a less degree of that inflammation, which constitutes Phrenitis," and "that the second stage is a less degree of that effusion which constitutes serous apoplexy in Adults". Other opinions have also been assigned, one of which is, that it is peculiar to inflammation, and it has also been supposed, that, in a majority of cases, congestion and a slight degree of inflammation, precede the accumulation of water.

Dr. Whytt supposed every kind of Dropsy to be produced by the same cause, viz; such a state of the parts as makes the exhalents throw out a greater quantity of fluid than the absorbents can take up. Dr. Darwin is said to have adopted the opinion, that Hydrocephalus is caused by

inactivity of the vessels of the Brain, but he also expressed his opinion that the torpor of the absorbent vessels is often a secondary consequence.

Many cases of the disease are accompanied with an inflammatory action of the vessels of the Brain, and other instances happen at the same time with Anasarca.

It is now supposed that Dropsy is the consequence of an alteration of the condition of the vessels of the part in which the disease appears, in either the cellular or the serous tissues, and that Inflammation usually accompanies this altered state, and that the remote causes tend to produce the same effect.

The Causes are such as act immediately on the Brain, or, in an indirect manner, on the organs of Digestion.

Disorganization of the Brain, schirrous affections, ossifications, tumours, may be mentioned as tending to produce it, as also, costiveness, irritation from worms &c.

Hydrocephalus may be confounded with several of the varieties of fever, but by paying particular attention to the symptoms of each disease, it is not, generally, a difficult

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task to distinguish them, as many of the symptoms which distinguish this disease, are not observeable in many cases of fever.

Symptoms. The symptoms are numerous, but before, the disease actually makes its appearance, the child is observ^d to droop and become dejected, and complains frequently, of pain in the head, has, at times, little or no appetite, and then, again, will express desire for food; his bowels are also, apparently, in a disordered state. Those around the patient, are fre=quently, unconscious of danger, until these symptoms put on so alarming a form, that fears for his safety are excited. Vomiting frequently, accompanies the above symptoms. Still, a disordered state of the Brain is not suspected.

At this time, evidences of some particular disease are so strong, that urgent remedial measures are thought neces=sary, and it is not sometimes, until after the disease has made some progress, that the attendants are sensible of its real nature.

The pain in the head is now continued and severe, with some degree of fever; the pupils are widely dilated;

there is redness of the eyes, stupor, strong aversion to light, extreme sensibility, great restlessness in sleep, with screaming &c.

The different stages of the disease are marked by different symptoms. In the first stage, which is called by Dr. Cheyne, that of increased sensibility, the case is apt to present a different aspect than it would, if watched with a due proportion of care. There is great fretfulness and restlessness, and the patient cannot in any way, be made easy. He moans, as if in great distress, and complains of a tiresome feeling. The countenance is pale, skin hard, tongue whitish, urine, high coloured and in small quantity.

The stools are not of a proper colour, being sometimes, of a dark green, again, of a whitish cast, and, in other instances, they present the appearance of tar.

Different parts of the body are affected with severe pain, darting from one part to another. The pulse is generally quick After a time, febrile symptoms come on, with frequent remissions, and there is nausea sickness of stomach, the bowels are constipated, the neck is affected with great pain and stiffness, the tongue is at times moist, and then again,

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dry, and the sensibility to light is great. The sufferings of the patient are not generally so severe in the morning as in the evening.

After the lapse of a short time, the pulse is slower, the bowels are either costive, and will admit of no relief, or the discharges are of the consistence of a jelly, are clay coloured, or are sometimes mixed with dry hard excrements of a greenish hue. The urine is now voided in still smaller quantity, the countenance wears a sullen and discontented aspect, and there is grinding of the teeth in sleep, which is interrup=ted by startings and groans. The strength of the patient, is, of course, by this time, greatly impaired, and his appearance much altered.

The effusions which now take place, probably lead the way to the next stage of the disease, at which crisis, the symptoms shew some degree of alteration. But it is not a general opinion that these symptoms are the effect of effusion. The patient has at this time, great difficulty in swallowing his food, shews pain in breathing, his abdomen is particularly tender, and his eyes exhibit an increased lustre. He makes different and apparently,

unmeaning motions with his hands, his mental powers are in a great degree impaired, and in some instances, there is delirium; convulsions come on, and there are involuntary discharges by stool, and frequently, very large quantities of transparent urine are evacuated. If the posture is changed, vomiting and retching are apt to be induced.

The pulse is now even slower and more feeble, and we can scarcely judge of its condition with propriety.

The paleness of the face, hollow temples, half closed eyes, and polished forehead show the great extent to which the disease has reached.

In the third stage the whole system is excited, and there is great distress both of head and stomach, strabismus, delirium generally, (though the intellect is in some instances good) coma and convulsions. The respiration is hard and active, and the pulse is more than naturally quick.

The duration of the disease is varied and uncertain. It sometimes extends to five or six weeks, although most frequently it terminates in about three weeks, and in some instances, a few days have closed the scene. This happens

sometimes, when the pulse shews no indication of such a state, when the system is already enfeebled, or when the preceding symptoms do not lead to the anticipation of such a result.

When eruptions recede, or there is an unexpected change in the system, these effects are sometimes produced. Those children are more liable to be affected in this way, who have been brought up in habits of indolence, or who are much emaciated, as also, those having a peculiar conformation, the head being large.

When the irritation which had subsisted in the Brain, seems to abate, when the alvine and urinary discharges present a natural appearance, when the skin is soft and of its usual warmth, and the stomach regaing its accustomed composure, we may with a great degree of certainty calculate on an auspicious termination of the disease. A very favorable sign is the natural flow from the nostrils, as we then are certain that the usual secretory actions have regained their proper place.

When there is great uneasiness on being raised from the bed, deafness, great dilatation of one or both pupils, or Strabismus, when there is loss of sight, the head much enlarged, great

difficulty in breathing, when the pulse is feeble and intermitting, and there are involuntary discharges, or when the discharges are very copious, we have very great reason to expect a fatal and speedy termination of the disease.

Why does it prevail more generally in children than in adults?

The causes assigned for this difference are that the head at the period of infancy, is disproportioned to the rest of the body, and that the vessels of the brain are more numerous, soft, and relaxed, and therefore the blood flows more swiftly, and that, at this early age, children are more liable to falls and blows, and frequently, in this manner, the head is injured, and these sometimes operate in producing the disease. Their amusements also, have a tendency to promote it, as many children accustom them=selves to various manuvres, such as standing on the head &c, and it is the opinion of some that rocking the cradle with great force, and agitating the body of the child in various ways, lends their aid in bringing on the complaint. But it is the opinion of Professor Chapman, that the above causes contribute less to the formation of the disease, than a

certain condition of the chylopoietic viscera, which lays the foundation of nearly all our morbid affections.

Dr. Cheyne contends, that when injuries of the head give rise to Hydrocephalus, "it is only immediately by producing this asthenic state, or by calling into play, what, by good and fortunate management had hitherto been latent, a scrophulous condition of the system," which he says, he had frequently seen to follow a severe accident, and "which wonderfully favours the establishment of Hydrocephalus."

The Brain is intimately associated with other parts of the body, as the liver, the alimentary canal, and when these organs are in a disordered condition, the Brain sympathizes with them, and hence symptoms appear which approach so nearly to those of Hydrocephalus, as to be mistaken for it, and it is sometimes brought on by that sympathy.

Frequently, before the symptoms are certainly defined, the viscera have been in a state of derangement for a long time, all the faculties seem to suffer, and the biliary secretions are evidently, not in a proper condition.

I have said that Hydrocephalus might be confounded

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with Fever, but by particularly attending to the symptoms of each, it would not be difficult to distinguish them.

The nature and degree of pain attending this complaint, both of the head and body, differ from that of Fever, and in the commencement of the disease, the symptoms of disorder in the stomach, the peculiar nature of the discharges, (when the disease is confirmed,) which contain generally a great deal of bile, the dislike expressed on exposure to light, with other symptoms, distinguish the two diseases.

When the mucous tissue of the stomach and intestinal tube is affected after catarrh fever, the disease is met with, and it also follows (in some instances) cholera infantum, and some others of the affections of the bowels, and, it is not unfrequently the sequel of some of the autumnal fevers which are so prevalent.

There is great sympathy between the mucous tissues, and the arachnoid membrane, and on that account, it is, that any affection of the one involves the other, (in some degree.)

The symptoms of Hydrocephalus which have not been of long duration, sometimes vanish, while the deranged state of the organs of digestion, calls for particular attention.

The condition of the Brain, in the different stages of the disease, is various. Some writers suppose that the first stage is marked by increased or inflammatory action in the vessels of the Brain, but it is the opinion of Dr. Cheyne, (whose essay on this subject is much valued,) that, "although there be excitement, probably, there is no increased vascular action in the Brain". He says, that in the commencement of the disease, the effects of the increased action upon the sensorium, are, perhaps not great, and, although the symptoms should denote extreme danger, that there is but little evidence of arterial action, but, before a long time, that the signs of such action will be manifest.

In the second stage, effusion has probably, found its way into the cavities of the cranium, the membranes seem to adhere, and we find evidences of congestion &c.

Dissections shew great diversity of appearance, which is in some measure, to be attributed to the great number of diseases

so nearly resembling Hydrocephalus, and also, because it has many varieties, as well as the different stages at which it terminates fatally. When death takes place in the regular forms of the disease, the meninges are found in a state of inflammation, particularly the arachnoid membrane, which contains a small quantity of fluid, the vessels of the Brain are generally enlarged, the blood dark coloured, and sometimes there is extravasation of coagulable lymph on the surfaces of the membranes. The membranes are in some degree, altered by the loss of transpa=rency, and acquire more thickness. Pus is also sometimes found mixed with the effusions. The effects of the disease are observed in every part of the Brain. The substance of the Brain is softer, and appears whitened, and is larger in some parts from increase of blood in the vessels, and inflammation of the cellular membrane. In the arachnoid membrane are found effusions, and also in the pia mater, and in the cavities of the Brain.

Sometimes the fluid is transparent, sometimes capable of coagulation, in other instances this coagulation does not appear; again, we find it possessing a great degree of thickness. The quantity of fluid varies greatly, in some instances, amounting to eight or more ounces,

in others, not one third of this quantity.

In other subjects, we can discern scarcely any, and in some, indeed, no appearance of disease in the whole structure of the Brain, but these instances are supposed to be very rarely met with.

The centre of the Brain appears to be the part which suffers most, as the effusions in the ventricles are much greater than those on the surface of the Brain. In some cases, where the disease has continued for a very long period, and the accumulation of water in the ventricles is very great, the substance of the Brain resembles a soft pulpy bag, containing a fluid. The shape of the Cranium is altered, and it appears much larger.

If the abdomen is examined, it is found, sometimes in a phlogosed state, and there is also inflammation of the Intestines. In some cases, a fetid smell is perceived, which arises probably, from the escape of air, which had been enclosed within the peritoneum. The chylopoietic viscera are found much disordered. The region of the liver is affected from accumulation of bloods, and, also from inflammation. This organ appears, of a light reddish hue, and it is sometimes joined to the peritoneum by strong adhesions.

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The mesenteric glands also shew signs of disease.

We should take into consideration, in making an estimate of the probable issue of the disease, the condition of the system at the time at which it is induced, and the manner in which it makes its appearance. If the original seat of the disease is in the Brain, the management of it is much more difficult, than when it is brought on by the excited action of the chylopoietic viscera. So likewise, when it occurs in children who are naturally feeble, there is much greater difficulty in the proper management of the disease, than when the patient is endowed with a naturally strong and vigorous constitution. After effusion has taken place, attempts at cure often prove unavailing. Before this, it is, generally, not a very difficult task.

Treatment. In the treatment of Hydrocephalus, the arterial action is first to be diminished.

General Bleeding is to be had recourse to, as well as topical, and then emetics, blistering the head, and an active course of purging. The antiphlogistic regimen should be strictly adhered to. When the head seems particularly to suffer, leeches, are thought serviceable, as they generally give ease, and the

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same remedy may also be applied to the epigastrium, when that is affected. General bleeding has been thought to be the first indication in the treatment of this disease, particularly when inflam=matory action is very strong, and in such cases, it is generally resorted to with success, in the first period of the disease. It should be repeated to such an extent as to diminish the congestion which exists, and also, to check arterial action. Caution, however, is requi=site, and it is perhaps, a better plan to apply leeches or cups, or scarifications are in some instances preferred, by which opera=tion, the blood is drawn off more speedily, and, generally to a more certain extent. Opening the jugular vein is also thought to be a proper method of extracting blood in these cases.

The appearance which the disease now puts on, should determine us as to the propriety of repeating the operation, and if there are still symptoms of inflammatory action, the bleeding should be repeated. But the abstraction of blood would be injudicious, if the disease is supposed to arise from general debility.

Dr. Cheyne is of opinion that great danger would result from the repeated abstraction of blood, unless the constitution

of the patient is very strong, or unless the disease has reached the second stage, as debility would be increased by it.

Blisters appear to be of great service in relieving the vessels of their load, and therefore a blister over the head is a desirable, as a copious discharge is in that manner, kept up. It is better, that a blister should first be put on the back of the neck, and, afterwards, over the whole head, and it should be kept on, until matter is discharged from all parts of it. To avoid strangury, the head should be shaved ten or twelve hours previously to the application of the blister, (if this is thought practicable.) In some instances, the severe pain is lessened, and the violence of the disease, in some measure, abates.

The blister should be kept on for twenty four hours. The surfaces should be dressed with mercurial ointment.

Emetics are generally thought to be serviceable, even when the stomach is not much disordered, and are said to be particularly so, when that organ is much affected.

But no course is perhaps better adapted to the disease, on its first appearance than the use of strongly purgative medicines, repeated as may be judged expedient.

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They lessen the determination to the head, particularly, when decisive symptoms of inflammation appear. If the functions of the alimentary canal seem not to be performed with their accustomed tone, or if the usual secretory action appears to be diminished, the purgative plan should be strictly pursued.

They are not only of service when the vessels of the brain are in a state of increased action, but also, when the bowels are in a disordered and vitiated condition, which is indicated by their fœtid state, and dark and ashy coloured stools.

They should generally be resorted to, immediately after venesection. As long as the state of the bowels, (above referred to,) continues, debility will not be induced.

In the early stage of the disease, the purging should be continued sometimes for three or four days, until stools are produced of a natural state and colour. Indeed, in some instances the disease has been completely arrested by the constant administration of purgative medicines. When there is a complete certainty as to the nature of the disease, and the deranged state of the bowels has been in some measure relieved, it appears now to be the received opinion, that the reabsorption of the

fluid in the vessels of the Brain should be attempted, and with a view to produce this, the use of Mercury should be resorted to.

If effusion should not have taken place, it has the effect of attracting the disease from the Brain, and causes the blood to take a different course, and if the fluid has found its way into the vessels of the brain, greater confidence is generally reposed in it than in any other remedy.

To gain relief from it, it must be used very decidedly, as a complete Salivation has in some cases effected a cure. It should be internally exhibited, the quantity being as great as the stomach and bowels will allow of, and fictions should be employed externally. It has been doubted whether the external use of Mercury is productive of any good effect in this case, but it should not be left untried.

The daily administration of Calomel joined with a few grains of Jalap, or Squills, or some medicine of that description, in doses suited to the age of the patient, has been thought to be productive of better effects than when given alone.

Dr. Cheyne gives the history of a case in which Mercury was employed to a great extent, the brain being violently

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affected, when it produced an evident effect, and a recovery resulted, and, he remarks, that he has, in several instances, observed, that "when the mercurial stimulus was fully established, the symptoms were interrupted, and the termination of the disease, although fatal, unlike, what we find in cases, where Mercury has not been used," and he continues, "the convulsions were suspended, the senses both external and internal restored, the disease appeared to be checked, but the debility was such that the vital functions languished, and the constitution had sustained so great a shock, that every effort to invigorate them, was unavailing." Other cases are also given in which the powers of Mercury were shewn to no small extent.

Digitalis, or Foxe Glove, has excited great attention in the treatment of this disease. It is a medicine of great uncertainty, and great discrimination is required, in the administration of it. It is supposed to relieve by lessening arterial action. It produces very singular effects on the system. Its operation on the constitution of different individuals renders it necessary that particular attention

should be paid to the constitutions of those in whose cases, it is prescribed. Under the impression of Digitalis, the pulse varies in different positions of the body. By some it is considered as a stimulating remedy, while others place it among the debilitating medicines. The quantity to be administered in this disease, is not easily determined, as some persons will bear a much larger dose than others. Different parts of the system are also affected by it. This medicine cannot safely be urged to a great extent, and therefore the dose, which is at first given, must be repeated, and, in that way, sometimes a good effect is produced, but, even then, the desired result is not entirely accomplished, so that a more ample administration of it seems requisite.

Great caution, however, is required in increasing the dose, as the particular effect which each dose produces, must be carefully noted, as in some constitutions, comparatively small doses will produce effects entirely unlooked for.

As to the mode in which it should be given, there seems to be a great diversity of opinion, some writers recommending the infusion, and others the tincture, and it

is asserted, that in some instances, it should be administered in substance. But the best form appears to be the tincture, commencing with a moderate dose, say, six, eight, or ten drops, and at the next administration, an addition of a drop or two, and so on, and in this way, its good effects are generally soon perceived. Upon the whole, Digitalis is considered an efficacious remedy in this, as well as in other cases of dropsical effusion, and it should in almost all cases, be tried.

In the commencement of the disease, cold or iced water, cold vinegar and water, and cloths dipped in ether and water, have been recommended.

Electrical shocks have also been thought useful.

Opium is said to be serviceable in sometimes allaying the intense pain which exists. Every method must be put in operation, which may aid in imparting strength to the patient, and with this view, Tonics are to be administered, and a nourishing diet, as soups, jellies &c. This is when the disease is on the decline.

The predisposition to this disease should be frustrated in every practicable manner, and with this

indication, particular attention should be paid to the state of the bowels, and paing taken to obviate constipation.

General weakness of the system, or low fever, may sometimes tend to produce the Chronic form of Hydrocephalus, which is difficult to cure, and ~~with this view~~, which is marked by severe suffeings, great increase in the size of the head, swelling of the abdomen, constipation of the bowels, the patient maintaining almost entirely, the recumbent posture. The quantity of urine, is in some instances, very great, and again there appears to be in this respect, a great deficiency.

Depletion is not generally thought useful in this case, though in some instances, the application of leeches is productive of good effects.

Purging, (as in the acute form of the disease) has been found particularly useful, and a combination of Calomel and Squills is recommended as the most efficient in the majority of cases.

Diuretics are highly recommended, and have been productive of very beneficial effects, and (I believe) it has

been asserted, that cures have been effected by their use.

The senses, and the mental faculties, remain, generally, in a great measure, unimpaired.

An operation for the cure of this affection has been performed, which consists of puncturing the cranium, and evacuating at intervals, a small quantity of the fluid. This is said to have been successful in some instances, but great judgment is requisite as to the particular cases, in which it should be recommended.

Careful and particular attention should be paid to the disease on the first appearance of its symptoms, as great diffiuulty is sometimes experienced in ascertaining its real nature, and after all due care and watchfullness, the termination will frequently be fatal.

A disease therefore, which is so frequently the cause of domestic affliction, should be entitled to our par= =ticular concern, and untiring attention, as the gratification experienced by all concerned in the restoration of the patient's health, more than compensates for the many anxious hours, spent in

watching the progress of the malady.

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